NOAA FISHERIES
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Authorizations and Permits for Protected Species (APPS)

File #: 16608-2R
Title: San Joaquin River Restoration Program Steelhe

Applicant Information

Affiliation: Bureau of Reclamation, San Joaquin River Restoration Program

Address: 2800 Cottage Way

City,State,Zip: Sacramento, CA 95825

Phone Number: (916)978-4624

Email: sjrrp@restoresjr.net

Project Information

File Number: 16608-2R

Application Status: **Application Complete - Issued**

Project Title: San Joaquin River Restoration Program Steelhead Monitoring

Project Status: Renewal

Previous Federal or State Permit: 16608

Permit Requested:
- ESA Section 10(a)(1)(A) permit (Pacific fish/invertebrate enhancement)

Where will activities occur? California (including offshore waters)

State department of fish and game/wildlife: N/A

Research Timeframe: **Start:** 12/01/2017 **End:** 12/31/2022

Sampling Season/Project Duration: Monitoring activities will occur from December 1 through April 30 over the next 5 years (2017 - 2021). Monitoring is anticipated to occur up to two weeks per month, however, frequency and duration of monitoring activities may vary slightly based on the size of the wetted area upstream of the San Joaquin-Merced River confluence, depending on natural river hydrology and San Joaquin River Restoration Program (SJRRP) Restoration Flows. A larger wetted area would require more time to complete monitoring activities. All sampling methods will be done concurrently. Monitoring activities are anticipated to occur in subsequent years, until ESA consultation for the Program is reinitiated when flows below Sack Dam reach 1660 cfs, with some potential modifications to the monitoring plan to address anticipated changes in the monitoring environment, including potentially increased Restoration flows and increased potential occurrence of spring-run Chinook salmon.

Abstract: This application is requesting renewal of permit 16608, issued on January 26, 2012, to continue implementation of the San Joaquin River Restoration Program (SJRRP) Steelhead Monitoring Plan (SMP).
SJRRP Restoration flows may attract Central Valley Steelhead (Onchorhynchus mykiss) into the SJRRP Restoration Area prior to completion of habitat improvements and measures to obscure false migratory pathways, and attracted fish would not have access to spawning habitat due to impassable barriers. In December 2012, Bureau of Reclamation implemented a SMP for the SJR upstream of the Merced River confluence that would, in the event of a capture, document and relocate steelhead downstream of the Merced River confluence. This activity would serve as a preventative measure to reduce or eliminate steelhead from entering SJRRP restoration project construction areas. Implementing the SMP is required as per the SJRRP NMFS BO, and is triggered when Restoration Flows reach the confluence with the Merced River. In addition to supporting Reclamation's ESA compliance for steelhead, this monitoring effort is intended to provide a missing data point on the distribution of steelhead and their use of the Restoration Area to inform future ESA consultations and the SJRRP. Regardless, ESA consultation for the Program will be reinitiated when flows below Sack Dam reach 1660 cfs and the need for a specific steelhead monitoring effort re-evaluated.
Electrofishing, fyke netting, and trammel netting have been used to determine the presence of subadult and adult steelhead from Mendota Dam to the confluence of the Merced River, including the adjoining sloughs from December-April. In the event of capture, steelhead would be transported in a 300-gal tank and released.

Project Description

Purpose: Potential routes to spawning habitats for migratory fish such as the Central Valley steelhead are believed to have been historically unhindered in the San Joaquin River before completion of the Friant Dam. Although little detailed information on steelhead distribution and abundance in the San Joaquin River is available (McEwan 2001, Lindley et al. 2006), steelhead in the Klamath River Basin typically overlapped with distributions of Chinook salmon (O. tshawytscha) though steelhead may distribute further upstream (Voight and Gale 1998, as cited in McEwan 2001). Therefore, steelhead may have spawned at least as far upstream as the natural barrier located at the present-day site of Mammoth Pool and the upper reaches of San Joaquin River tributaries. Modeling of potential steelhead habitat by Lindley et al. (2006) suggests that a portion of the upper San Joaquin River basin historically supported an independent steelhead population. However, much of the habitat downstream from this population's modeled distribution may have been unsuitable for rearing because of high summer water temperatures. Lindley et al. (2006) concluded that suitable steelhead habitat existed historically in all major San Joaquin River tributaries. Additionally, steelhead are historically documented in the Tuolumne and Kings River systems (McEwan 2001).
Steelhead abundance and distribution in the San Joaquin River basin have substantially decreased (McEwan 2001), and steelhead have been extirpated from the Restoration Area

of the San Joaquin River Restoration Program since the construction of Friant Dam. Based on their review of factors contributing to steelhead declines in the Central Valley, McEwan and Jackson (1996) concluded that basin-wide population declines were related to water development and flow management that resulted in habitat loss. Dams have blocked access to historical spawning and rearing habitat upstream, thus forcing steelhead to spawn and rear in the lower portion of the rivers where water temperatures are often high enough to be lethal (Yoshiyama et al. 1996, McEwan 2001, Lindley et al. 2006). However, steelhead continue to persist in low numbers in San Joaquin tributaries downstream of the Restoration Area (McEwan 2001, Zimmerman et al. 2008).

The Central Valley Steelhead Distinct Population Segment (DPS) includes naturally spawning populations of steelhead (Oncorhynchus mykiss), and their progeny, in the Sacramento and San Joaquin Rivers and their tributaries and is protected under the U.S. Endangered Species Act; 61 FR 4722 (NMFS 2005); tributaries include those that drain the western slopes of the Sierra Nevada Mountains (i.e., Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, Fresno, upper San Joaquin, Kings, Kaweah, and Kern Rivers, and Caliente Creek; NMFS 2009). Currently, CV steelhead DPS critical habitat extends upstream on the San Joaquin River to the confluence with the Merced River (NMFS 2011). According to Eilers et al. (2010), CV steelhead are currently extirpated from all waters upstream of the Merced-San Joaquin River confluence. However, irrigation return and Restoration flows could attract adult steelhead into the Restoration Area. Attracted steelhead would not have access to appropriate spawning habitat due to a number of impassable barriers and risk stranding. During the ESA consultation process with the National Marine Fisheries Service (NMFS) for the Program, the Bureau of Reclamation did not believe that the impacts of the Program would affect steelhead and thus did not request incidental take for steelhead. Instead, Reclamation proposed to implement a steelhead monitoring plan in order to demonstrate whether steelhead are using the lower Restoration Area. The proposed steelhead monitoring plan will be implemented in accordance with the 2012 SJRRP NMFS BO.

Two to three year-old Central Valley steelhead generally migrate to freshwater (Reynolds 1993), and occurrence of adults in the San Joaquin River range between July and April of the following year, but peaks in January (CDFG 2007) when small streams and tributaries are cool and well- oxygenated (Williams 2006). Unlike other salmonids which can only spawn once before death, a percentage of steelhead population (17.2%) in California streams can return to the ocean and migrate back upstream to spawn again in subsequent years (Shapovalov and Taft 1954).

Because Central Valley steelhead are thought to be extirpated from the Restoration Area, and none have been recovered in previous study years, it is anticipated that no steelhead will be recovered during these efforts. However, ancillary data that will be collected is valuable in providing foundational baseline information of fish community assemblages and native fishes for downstream reaches of the Restoration Area. Continued monitoring of adult Central Valley steelhead migration in the Restoration Area provides important information regarding this species' distribution. This San Joaquin River Restoration Program's Steelhead Monitoring Plan will also provide valuable information on the most southern extent of Central Valley Steelhead to the California Department of Fish and Wildlife comprehensive monitoring plan for steelhead in the California Central Valley. Monitoring of the San Joaquin River upstream of the Merced River confluence will provide data necessary to help assess the recovery of Central Valley Steelhead by determining its distribution, abundance, and populations trends. The objectives of the study are to: 1) Monitor for adult Central Valley Steelhead on the wetted sections of the San Joaquin River below Mendota Dam (or lower, depending on passage conditions) to the Merced River confluence, and 2) Relocate Central Valley steelhead, in the event of a capture, to more suitable habitat below the confluence with the Merced River. Relocation of Central Valley Steelhead caught within the Restoration Area to a release location downstream of the Merced River confluence was initially requested by NMFS as there is currently no accessible spawning habitat due to impassable barriers including seasonally dry riverbed and false migratory pathways from agricultural and Refuge wetland effluents. The elevated stranding and entrainment risk due to fluctuating water conditions along with potentially high water temperatures may compromise the survival of Central Valley Steelhead within the Restoration Area until passage and entrainment issues are alleviated. Relocation of fish caught within the Restoration Area would save them from entrainment in areas that do not have suitable spawning habitat and allow them to continue their migration to potentially suitable spawning habitat on other San Joaquin River tributaries downstream of the Restoration Area.

There have been no observed Spring-run Chinook salmon (Oncorhynchus tshawytscha) thus far in the Restoration Program. In 2016, there was potential that two and three year old adult Spring-run Chinook salmon would have returned to the San Joaquin River from Restoration Program smolt releases. There is no known information on run timing for both Steelhead and Spring-run Chinook salmon on the upper San Joaquin, but it is believed that there may be some overlap in upstream migration to spawning areas for both salmonids in late-February, March and April. It is anticipated that adult steelhead will migrate through the San Joaquin River near the confluence of the Merced (beginning of Restoration Area) in December–April and Spring-run Chinook salmon from March–May. Because spring-run Chinook may be encountered during this effort, some take of

spring-run is included in this permit. Because spring-run are a non-essential experimental population in the sampling area, take is requested for tracking purposes only. The post capture handling of spring-run Chinook salmon is covered under 10(a)(1)(A) permit #17781. High water temperatures and low flows may restrict movement of salmonids into the San Joaquin upstream of the Merced River confluence in June and July. The San Joaquin River Restoration Program under 10(a)(1)(A) permit #17781 is authorized to monitor spring-run Chinook Salmon using fyke nets, weirs, and sampling with a Vaki Riverwatcher on the San Joaquin River from the confluence of the Merced River to Sack Dam during February through August. Fyke nets or temporary weirs with electronic counting devices (e.g., Vaki) attached will be used to evaluate the distribution and abundance of adult spring-run Chinook salmon returning to the San Joaquin River upstream of the confluence to the Merced River to Sack Dam. Trapping (Fyke Net/Weir) would only occur if the 7-day mean daily water temperature at the capture site and the release location is below the upper thermal limit of 23.1°C (73.6°F) but preferably below 20°C (68°F). A fyke net or temporary weir with a Vaki Unit will be placed near the Hill's Ferry Barrier area and will be checked or maintained daily or as needed. Fish counted by the Vaki Unit will only be observed by the device as they pass through an opened portion of the fyke net or temporary weir, and will not be handled.

Description: Flows could attract adult steelhead into the San Joaquin River Restoration Area and attracted fish would not have access to appropriate spawning habitat due to a number of impassable barriers. The Bureau of Reclamation is implementing a steelhead monitoring and detection plan (SMP) for the SJR, upstream of the confluence with the Merced River, that, in the event of a capture, would result in in recording and subsequent transportation of the fish downstream of the Restoration Area. The Steelhead Monitoring Plan is regulatory requirement triggered when Friant Dam flows reach the confluence with the Merced River. During the ESA consultation process with NMFS for the Program, Reclamation did not believe that the impacts of the Program would affect steelhead and thus did not request ESA coverage for steelhead. Instead, Reclamation proposed to implement a steelhead monitoring plan in order to demonstrate whether steelhead were using the lower Restoration Area or not. The thought being that if steelhead were detected, then Reclamation would reinitiate ESA consultation with NMFS. The Steelhead Monitoring Plan was developed by the Fisheries Management Workgroup and presents a broad set of sampling techniques that could be employed depending on river conditions. The monitoring plan also became part of the project description in the ESA consultation for the Arroyo Canal/Sack Dam project and Operation of Hills Ferry Barrier. The Steelhead Monitoring Plan will conduct monitoring activities from December 1 through April 31 within the following areas: the San Joaquin River between the base of Mendota Dam and just upstream of the confluence of the San Joaquin River and Merced River, the mouth of Mud Slough, the San Joaquin River near the Highway 140 bridge, the mouth of Salt Slough, just below Sack Dam, and at the return points of the Eastside and Mariposa bypasses on the San Joaquin River. All monitoring sites lie within the Middle San Joaquin-Lower Stream hydrologic unit code (HUC), Mile 182.0 to mile 118.0. In addition, the Steelhead Monitoring Plan proposes to rescue Central Valley steelhead that would not have access to suitable spawning habitat further upstream on the San Joaquin River due to the presence of numerous upstream passage impediments and the greater likelihood for entrainment or death in Reaches 4 and 5.

Take activities for subadult-adult Central Valley Steelhead associated with the proposed action include: capture (raft-mounted electrofisher), fyke nets with wing walls and fish traps, and steelhead-specific trammel nets), handling (conducting length measurements, gender identification, tissue and scale collection assessment of condition, checking for the presence of tags, and Passive Integrated Transponder (PIT) tagging of steelhead. Captured steelhead will be transported by tank truck and released in the San Joaquin River downstream of the mouth of the Merced River. Recaptured steelhead will be identified by the presence of a PIT tag.

Because CV steelhead are thought to be extirpated from the Restoration Area, and none have been recovered in previous study years, it is anticipated that no steelhead will be recovered during these efforts. However, ESA consultation for the Program will be reinitiated if a single steelhead is determined to be present in the Restoration Area. Upon consultation with NMFS, the need for a specific steelhead monitoring effort will be re-evaluated at that time based on the monitoring information that was collected to date.

Supplemental Information

Status of Species: Steelhead population in the SJR was extirpated; however, small populations of steelhead persist in the lower SJR tributaries (i.e., the Stanislaus and Tuolumne Rivers and possibly the Merced River) and in the Calaveras River. Monitoring of steelhead in the SJR and its tributaries is especially challenging due to extremely low abundance. Steelhead populations are depressed to the point where monitoring opportunities are limited because sample sizes are too low to use statistical analyses, and depressed to the point that even determination of presence is difficult. Steelhead are currently extirpated from all waters upstream of the Merced-SJR confluence. NMFS has concluded that populations of naturally reproducing steelhead have been experiencing a long-term decline in abundance throughout their range. Populations in the southern portion of the range have experienced the most severe declines and stocks in California has been particularly steep. Please refer to the 2014 Steelhead Monitoring Plan Report and SJRRP Programmatic Biological Assessment for more information. No steelhead were observed during 2012–2014 SJRRP Steelhead Monitoring efforts.

The San Joaquin River historically supported large runs of spring-run Chinook salmon. Completion of Friant Dam and reduced flows into the mainstem SJR dried up downstream river sections. By 1950, the entire run of spring-run was extirpated. To facilitate reestablishment of spring-run Chinook Salmon within the SJRRP, juvenile spring-run were released in 2014 and 20154 as an experimental population. It is anticipated that these fish could begin returning to the SJR as adults during the spring of 2017. Monitoring and translocation of these returning fish is needed as in-river barriers exist. Steelhead monitoring from January–April will serve as a means to monitor early returning adult spring-run Chinook salmon. No spring-run Chinook salmon adults were observed entering the Restoration Area during the 2016 monitoring efforts

Methods: Migrating adult steelhead are difficult to monitor with commonly used salmonid monitoring techniques (e.g., carcass surveys, snorkel surveys, redd counts) due to their unique life-history traits. Steelhead, unlike salmon, may not die after spawning. Therefore, carcasses may not be available for a mark- recapture survey. In addition, steelhead migrate and spawn during the late-fall, winter, and spring months when rivers have periods of pulse flows (e.g., Vernalis Adaptive Management Plan, Merced River pulses), high flows (e.g., flood releases), and turbid water conditions. The following sampling methods will be used for the CV steelhead monitoring plan:

Electrofishing– Electrofishing is a common method used in monitoring steelhead populations (e.g., Mill and Deer Creeks, and Feather, American, Mokelumne, Stanislaus, and Merced Rivers). One potential drawback from electrofishing involves the difficulty in obtaining permits due to the possibility of injuring anadromous salmonids (Eilers 2008). However, electrofishing effectiveness and safety have improved over time (Bonar et al. 2009). Design specifications to reduce injury to fish, and a comprehensive review of electrofishing literature can be found in Snyder (2003).

Sampling will be completed from December–April annually after the Hills Ferry Barrier is removed and adult fall-run trap and haul has ceased. Repeated capture of resident fish (non-steelhead) is anticipated, thus intervals between sampling periods will help provide recovery time from sampling and handling stress. Electrofishing methods will follow NMFS guidelines for sampling waters with anadromous fish (NMFS 2000). However, stated guidelines were for backpack electrofishing, though steelhead monitoring biologists and were not precluded from boat electrofishing. A Smith-Root 5.0 GPP raft-mounted electrofisher (Smith Root, Vancouver, WA) will be used during this time using the following settings: pulsed direct current, voltage range set at 50-500 V, with a power output range of 10-60%, and cycle frequency from 15–60 Hz. Settings will be determined by water conductivity and adjusted to maximize capture efficiency while minimizing electrical exposure (i.e., lowest setting required to elicit response without extended shocking times). Sampling sites will include: Mud Slough, Salt Slough, Newman Wasteway, Eastside Bypass, Mariposa Bypass, Sand Slough Control Structure, and the base of Sack Dam.

Fyke Nets– Fyke nets will be used to survey for upstream migrating steelhead. Fyke nets are constructed of 2.4-cm square #252 knotless nylon netting formed over 5 consecutive 1.2-m hoops and a 1.2-m square, welded-conduit frame entrance. The traps contain 2 throats with a 25-cm diameter opening. Wings walls, attached to the sides of the net opening, are 1.2 m deep and long enough to span the river (max wing length 30.5 m), with small floats spaced every 61 cm on top, and a lead line on

bottom. Nets are held in place with anchored t-posts. The net entrances face downstream, with the wing walls extending to shore in a v-shaped pattern. Fyke nets will be deployed in sampling locations, but not limited to, upstream of the confluence of the Merced River, mainstem San Joaquin River, mouths of Mud Slough, Newman Wasteway, and existing structure at Sack Dam. This proposed technique will be implemented once the Hills Ferry Barrier is removed around mid-December and may remain deployed until the end of April. Marker buoys will be placed up- and downstream of each fyke net, and flashing amber lights and visibility tape will be affixed to the net and wing walls to alert boaters of the net's presence. Daily checks will take place to reduce the likelihood of injuring fish. Sampling occurring from February through April 2017 will be used to supplement the pilot adult spring-run Chinook Salmon monitoring being conducted by the U.S. Fish and Wildlife Service using a v-shaped net paired with a Vaki Riverwatcher Unit near Hills Ferry (10a1A permit #17781).

Trammel Nets– Trammel nets are most commonly used as stationary gear to block off channels with low velocities or no flows. The nets consist of three parallel vertical layers of netting; the inner net has a smaller mesh size (small hole spacing to prevent steelhead from becoming gilled), while the outer nets have mesh size large enough for fish to pass. The larger and smaller mesh size nets form a pocket when fish try to swim through. A buoyant top line and weighted bottom line keeps the trammel net oriented vertically in the water column. Brightly colored buoys will be attached to the terminal ends of the net to alert boaters and other recreationists to the nets and avoid entangling themselves, their boats, or their fishing gear. Trammel nets range in size from 0.9-1.8 m (3-6 ft.) tall and 11.4-30.5 m (37.5–100 ft.) long. Trammel nets will be continuously monitored and set for a maximum period of 4 h. Trammel nets may also be employed during high velocity flows, manned during the entire time of their deployment, and their drift cycle will be limited to 10 minutes. To ensure the safety of steelhead, fisheries biologists tending the nets will follow at a close distance to observe risk of entanglement, and respond quickly to retrieve the nets. Sampling time will depend on the number of fish and bycatch caught at each location. Capture of the same fish multiple times is to be anticipated, thus monthly sampling is important to ensure fish recovery from stress between captures.

Seine - When electrofishing or fyke netting cannot be effectively used to capture steelhead, a hand seine will be used to safely collect fish. This would be the primary means for collecting fish below a passage impediment or potentially entrained in a small canal or pool in shallow water, as seines are often used to capture adults for rescue/relocation. Seines for steelhead monitoring will be constructed of 1/2-inch nylon knotless mesh, hand tied to a 5/16-inch hollow-braided polypropylene rope with 4-inch floats every 24 inches on top, and #10 leads every 12 inches on the bottom. These nets are 6 foot tall and 75 feet long. However, seines of various lengths and mesh sizes will be used depending on location, flows, river conditions, and size of target fish. Mesh size will be decreased for juvenile salmonids and knotted mesh should never be used as it has abrasion risks.

The pattern of seining and seine size will depend on the structure of the pool to be seined, with a goal to ensure the best coverage of the pool without risking having the seine hang up on debris and allowing the fish to escape. Generally, the seine is deployed, circling the fish, and pulled closer the shore. The net poles on the ends are positioned forward and the lead-line is kept snug to the bottom, as the net is pulled to shore. Personnel seining will be careful not to seine debris in a manner that could injure fish. The seine will be inspected in the water for listed species. Steelhead entrapped in the seine purse will be subsequently processed and removed for transport, and bycatch immediately released to the water. Steelhead captured by seine are placed in 15-gallon tub and hand-carried to the transport tank.

Fyke Trap

During high flood flow conditions turbidities, depths, and debris loads, may render other methods to monitor and capture CCV steelhead challenging and ineffective. Therefore, steel fyke-traps may be deployed as an alternative to these methods under a high flow year. Steel fyke-traps have two chambers (42-in diameter) with a reduced funnel (22-in diameter) opening between chambers, and are constructed of 2.25-in plastic coated chainmail. These have a large internal compartment

constructed of high tensile resin-infused netting, permitting capture and maintenance of adult salmonids without inadvertently causing injury or excessive stress. Traps are equipped with exclusion bars and plastic internal fykes to restrict entry and allow for escape of aquatic mammals. Traps will be deployed upstream of the Merced River confluence, and will be checked at least once daily. Ample boat passage will be made available, and orange buoys and flashing amber caution lights will alert river-users to the traps.

Fish Handling and Relocation– In the event that a steelhead is captured during monitoring activities, data will be collected according to the Department of Fish and Wildlife Comprehensive Monitoring Plan for Steelhead in the California Central Valley (2010). Fish will be subjected to the following handling and transporting procedures: Steelhead would be documented, measured (FL/TL), sexed (if possible), scale and tissue samples collected (Bagenal and Tesch 1978), checked for injuries and presence of identifying tags, and photo documented. Additionally, fish would be PIT tagged with a unique identification number for future identification. Captured steelhead would be transported downstream, below the SJR and Merced River confluence (near latitude, longitude: 37.350356, -120.976167). The exact release location would be dependent on river conditions. Transport would involve water to water transfers, a 550-L transport tank, and smaller transport containers may be used for short distances (i.e. where access to the stream is limited to access by foot). Immediately prior to transport, the tank would be filled with river water near the area of capture. Salt (NaCl) would be added to the transport water to decrease the cellular-holding water ionic gradient as a means to minimize stress. Steelhead would then be transferred from the river to the transport tank with a water-to-water transfer to reduce handling stress and loss of slime. Oxygen would be supplied via compressed cylinder and micro-bubble diffusers to maintain dissolved oxygen levels near saturation. In the instance of extended transport duration (i.e., >30 min), an inspection of the fish and transport equipment would occur after the first 30 minutes, and each hour thereafter. Captured steelhead would be acclimated to receiving water conditions (i.e., temperature and chemical gradients) at the release location.

Lethal water temperatures for migrating adult steelhead is 23-24 °C (75°F) and thought to be higher for those populations acclimated to locations in the southern extent of their occurring range. In order to not jeopardize steelhead that may be present, no steelhead monitoring will occur if river temperatures reach 20 °C (68 °F). However, temperatures during previous monitoring periods did not elevate beyond 18.4 °C (65 °F). In the unlikelihood of a juvenile steelhead capture, scales and fin clip will only be collected from live steelhead when water temperatures are below 15.5 °C (60 °F).

Vaki Riverwatcher- Upstream migrating adult spring-run Chinook Salmon and Steelhead will be visually monitored continuously by a Vaki RiverWatcher in the San Joaquin River near Hills Ferry (Reach 5) from February through July. A scanner unit will be anchored to the riverbed using steel posts and connected to two wing walls consisting of 2.4-cm square knotless nylon netting. Wing walls, attached to the sides of the scanner unit's frame, will be at least 1.2 m deep and long enough to span the width of the river, with small floats spaced every 61 cm on top and a lead line on bottom. The scanner unit and its wing walls will be held in place with anchored T-posts. Net entrance will face downstream, with wing walls extending to shore in a v-shaped pattern. T-posts used to secure the fyke nets and wing walls, as well as weir anchor posts, will be marked with highly visible flagging, and at least one flashing light to provide visual warning cues for boaters.

The scanner unit will be connected and configured to scan and record the silhouette of each fish that volitionally passes through the wing walls and scanner unit. The scanner unit will estimate the total length of each fish passing through the unit and record the water temperature during each fish passage event. Using the silhouette of the fish, we will be able to determine if the fish is adipose clipped. All information collected by the scanner unit will be stored in a control unit powered by a deep cycle battery, which will be recharged using solar panels or a generator as needed. The scanner unit will be checked daily throughout the sampling period to ensure stability and proper function of the equipment. These data will be subsequently stored in and analyzed using Winari software located at the Lodi Fish and Wildlife Office.

Lethal Take: N/A

Anticipated Effects on Animals:	There will likely be minimal effects associated with electrofishing, fyke and trammel netting, and the Vaki Riverwatcher on associated sampling/handling stress of steelhead. Monitoring efforts may also delay upstream migration as temporary nets in the river due pose a short-duration migration barrier. There should be no adverse effects on aquatic reptiles and mammals during the December–April time period.
Measures to Minimize Effects:	All persons implementing SJRRP steelhead monitoring activities will be knowledgeable with the conditions of all applicable permits and requirements of the Endangered Species Act, will follow the conditions of all applicable permits, and will follow appropriate protocols to minimize injury to sampled fish and will have access to properly maintained state-of-the-art equipment. Live steelhead shall be handled with extreme care and kept in water to the maximum extent possible during sampling and processing procedures. Adequate circulation and replenishment of water will be maintained in holding units. When a sample is comprised of a mix of species, any captured steelhead will be processed first and removed as soon as possible after being captured to minimize the duration of handling stress. Distressed steelhead rescued at the capture site will be allowed to recover to the maximum extent possible prior to being released into the mainstem San Joaquin River. Each researcher using an electrofisher as a sampling technique will follow operation protocols described in the "NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act, June 2000" (Guidelines). Prior to the start of electrofishing at each location, water temperature and conductivity measurements will be taken to determine the criteria appropriate electrofishing guidance. Fyke traps will be checked daily (every 24 hours), at a minimum, during operation. During periods of peak migration, high flows, and/or debris levels during storm periods, traps may be checked more frequently, as needed, to minimize potential for mortality. Trammel net drifts will be continuously monitored in the San Joaquin River. Steelhead will not be handled if stream temperatures at the capture site exceed 20 °C (68 °F). Under these conditions, fish will only be identified and counted. Scales will only be collected from live juvenile salmonids when water temperatures are below 15.5 °C (60 °F).
Resources Needed to Accomplish Objectives:	The San Joaquin River Restoration Program maintains the staffing expertise, boats, sampling gear, access agreements, and funding to successfully accomplish the objectives and activities stated in this application. Reclamation biologists leading this effort have over 15 years' experience as fisheries biologist working with a variety of salmonids and other fishes throughout the western United States. These monitoring activities had been previously covered and completed under ESA Section 10 research permit (#16608). Please refer to 2012-2014 Steelhead Monitoring Reports for more detail on equipment and resources that will be used.
Disposition of Tissues:	Although not anticipated under the proposed action, non-intentional mortality of steelhead due to project activities, should it occur, will be preserved as voucher specimens or sampled for tissue collection, to be sent to the California Department of Fish and Wildlife Central Valley Salmonid Genetic Repository. Preservation protocols will be confirmed by California Department of Fish and Wildlife scientist Robert Titus. Any tissues/mortalities of juvenile steelhead that are unintentionally killed during research activities will be made available to NMFS upon request.

Public Availability of Product/Publications: Annual reports of steelhead monitoring activities will be provided to NMFS for posting on their website. Annual reports will include: a detailed description of activities conducted, electrofishing data, description of any unforeseen problems or effects, description of effects on animals, method used to estimate take if different from proposed method, steps taken to coordinate actions with other permit holders, summary of project findings, and titles of reports available.

Federal Information

Federal Agency	Type	Authorization Number and Title	Date Signed	Expiration Date	Listing Units/Stocks Covered	Comments
U.S. Army Corps of Engineers (Corps)	Other	Section 404 and 401 of the Clean Water Act and Sec			N/A	Reclamation will coordinate with the Corps on completing the appropriate Nationwide Permit and with the Regional Water Quality Control Board prior to implementing the SMP in December 2016
U.S. Bureau of Reclamation (BOR)	Other	SJRRP Programmatic Environmental Impact Statement/	10/04/2012		N/A	
National Marine Fisheries Service (NMFS)	Section 7 Consultation (Biological Opinion)	San Joaquin River Restoration Program BO	09/18/2012		Chinook Salmon, Sacramento River winter-run (NMFS Endangered);Steelhead, California Central Valley (NMFS Threatened);Chinook Salmon, Central Valley spring-run (NMFS Threatened);Green Sturgeon, Southern DPS (NMFS Threatened)	
U.S. Bureau of Reclamation (BOR)	Funding	2012 SJRRP Record of Decision (ROD)			N/A	Reclamation will fund the steelhead monitoring as described in the 2012 Programmatic Environmental Impact Statement/Report, and in accordance with the 2012 SJRRP NMFS BO

Location/Take Information

Location

Study Number 16608-2R **Research Area:** Pacific Ocean **State:** CA **Sub Basin (4th Field HUC):** Middle San Joaquin-Lower Merced-Lower Stanislaus **Stream Name:** San Joaquin River
Begin Mile: 204.8 **End Mile:** 118.0
Location Description: San Joaquin River between the base of Mendota Dam to the confluence of the San Joaquin River and Merced River. In most years, passage will be limited past sack Dam,

thus this will be the upstream terminus.

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Indirect Mort	Take Action	Observe /Collect Method	Procedure	Run	Transport Record	Begin Date	End Date
1		Steelhead	California Central Valley (NMFS Threatened)	Natural	Adult	Male and Female	5	1	Collect, Sample, and Transport Live Animal	Net, Fyke	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2020
		Details: trammel net, fyke trap, or hand seines may also be used as appropriate													
2		Steelhead	California Central Valley (NMFS Threatened)	Natural	Adult	Male and Female	2	1	Collect, Sample, and Transport Live Animal	Electrofishing, Boat	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2020
3		Steelhead	California Central Valley (NMFS Threatened)	Natural	Adult	Male and Female	10	0	Observe/Harass	Observations at weirs, fish ladders, dams where no trapping occurs		N/A	N/A	12/1/2017	12/1/2021
4		Steelhead	California Central Valley (NMFS Threatened)	Listed Hatchery Adipose Clip	Adult	Male and Female	5	1	Collect, Sample, and Transport Live Animal	Net, Fyke	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2021
		Details: trammel net, fyke trap, or hand seines may also be used as appropriate													
5		Steelhead	California Central Valley (NMFS Threatened)	Listed Hatchery Adipose Clip	Adult	Male and Female	2	1	Collect, Sample, and Transport Live Animal	Electrofishing, Boat	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2021
6		Steelhead	California Central Valley (NMFS Threatened)	Listed Hatchery Adipose Clip	Adult	Male and Female	10	0	Observe/Harass	Observations at weirs, fish ladders, dams where no trapping occurs		N/A	N/A	12/1/2017	12/1/2021

7		Salmon, Chinook	Central Valley spring-run (NMFS Threatened)	Natural	Adult	Male and Female	20	1	Collect, Sample, and Transport Live Animal	Net, Fyke	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2020
		Details: trammel net, fyke trap, or hand seines may also be used as appropriate													
8		Salmon, Chinook	Central Valley spring-run (NMFS Threatened)	Natural	Adult	Male and Female	8	1	Collect, Sample, and Transport Live Animal	Electrofishing, Boat	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2020
9		Salmon, Chinook	Central Valley spring-run (NMFS Threatened)	Natural	Adult	Male and Female	40	0	Observe/Harass	Observations at weirs, fish ladders, dams where no trapping occurs		N/A	N/A	12/1/2017	12/1/2021
10		Salmon, Chinook	Central Valley spring-run (NMFS Threatened)	Listed Hatchery Adipose Clip	Adult	Male and Female	20	1	Collect, Sample, and Transport Live Animal	Net, Fyke	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2021
		Details: trammel net, fyke trap, or hand seines may also be used as appropriate													
11		Salmon, Chinook	Central Valley spring-run (NMFS Threatened)	Listed Hatchery Adipose Clip	Adult	Male and Female	8	1	Collect, Sample, and Transport Live Animal	Electrofishing, Boat	Tag, PIT; Tissue Sample Fin or Opercle; Tissue Sample Scale	N/A	1	12/1/2017	12/1/2021
12		Salmon, Chinook	Central Valley spring-run (NMFS Threatened)	Listed Hatchery Adipose Clip	Adult	Male and Female	40	0	Observe/Harass	Observations at weirs, fish ladders, dams where no trapping occurs		N/A	N/A	12/1/2017	12/1/2021

Transport Information

1. **Mode(s) of Transportation:** Captured steelhead would be transported downstream, near the SJR and Merced confluence in a 300 or 500-gallon transport tank this mounted to a tandem axle trailer and pulled by a 3/4 ton or larger truck

Transportation Company:	Fisheries biologist at Reclamation's SJRRP office and Technical Service Center have transported nearly 2000 adult Chinook salmon since 2012 with <1% mortality. They have also successfully transported fish for >2000 miles for research purposes.
Maximum amount of time between capture and arrival:	The maximum drive time is approximately an hour and does not include release site acclimation
Container Description:	Steelhead will be translocated in a 300 or 500-gallon insulated fish transport tank. River water near the capture site will be used along with salt (NaCl) added to minimize stress. Oxygen is supplied via micro-bubble diffusers to maintain DO levels.
Special Care:	Capture site water used and fish acclimated to release site. Salt (5ppt) added to minimize stress. Water-to-water fish transfers to reduce handling stress and slime loss. Oxygen to maintain DO near saturation. Temperature and water quality monitored.
Accompanying Personnel Qualifications:	Fish biologist with over 15 years experience transporting fish and/or a fish physiologist may be present. Fish biologists have had extensive training in fish husbandry and fish health assessments.
Facility Title:	San Joaquin River
Facility Affiliation/Organization:	Reclamation, FWS
Address:	San Joaquin River, CA UNITED STATES
Phone Number:	
Containment Method:	Animals will not be held and immediately released at downstream relocation site after transport
Final Disposition:	Fish will be released live downstream of the confluence of the San Joaquin and Merced Rivers.

NEPA Checklist

1) If your activities will involve equipment (e.g., scientific instruments) or techniques that are new, untested,or otherwise have unknown or uncertain impacts on the biological or physical environment , please discuss the degree to which they are likely to be adopted by others for similar activities or applied more broadly.

All techniques are common fisheries techniques and if used properly have great success at safely catching fish.

2) If your activities involve collecting, handling, or transporting potentially infectious agents or pathogens (e.g., biological specimens such as live animals or blood), or using or transporting hazardous substances (e.g., toxic chemicals), provide a description of the protocols you will use to ensure public health and human safety are not adversely affected, such as by spread of zoonotic diseases or contamination of food or water supplies.

Past activities have occurred within a 20 mile stretch of river that is well boated and is currently not positive for zebra/Quagga mussels. Fish collection and transport gear along with personal equipment (i.e., waders, dry suits, etc) for this monitoring effort is only used on the Restoration Area of the San Joaquin River and is decontaminated after use. Acetic acid is used to clean live holds and bilges in boats and transport tanks.

3) Describe the physical characteristics of your project location, including whether you will be working in or near unique geographic areas such as state or National Marine

Sanctuaries, Marine Protected Areas, Parks or Wilderness Areas, Wildlife Refuges, Wild and Scenic Rivers, designated Critical Habitat for endangered or threatened species, Essential Fish Habitat, etc. Discuss how your activities could impact the physical environment, such as by direct alteration of substrate during use of bottom trawls, setting nets, anchoring vessels or buoys, erecting blinds or other structures, or ingress and egress of researchers, and measures you will take to minimize these impacts.

Please refer to the 2014 SJRRP Steelhead Monitoring Plan Report for details on the study area. While the San Joaquin River is designated as Essential Fish Habitat (EFH), the proposed action would not have any effects on EFH. The proposed action would not adversely affect the study area, and access to study sites would be through existing access routes, and will implement the SJRRP Conservation Strategies as described in the SJRRP Final PEIS/R to avoid adverse impacts to habitats.

4) Briefly describe important scientific, cultural, or historic resources (e.g., archeological resources, animals used for subsistence, sites listed in or eligible for listing in the National Register of Historic Places) in your project area and discuss measures you will take to ensure your work does not cause loss or destruction of such resources. If your activity will target marine mammals in Alaska or Washington, discuss measures you will take to ensure your project does not adversely affect the availability (e.g., distribution, abundance) or suitability (e.g., food safety) of these animals for subsistence uses.

The proposed action does not have the potential to impact any scientific, cultural or historic resources.

5) Discuss whether your project involves activities known or suspected of introducing or spreading invasive species, intentionally or not, (e.g., transporting animals or tissues, discharging ballast water, use of equipment at multiple sites). Describe measures you would take to prevent the possible introduction or spread of non-indigenous or invasive species, including plants, animals, microbes, or other biological agents.

The proposed action would not involve the potential to spread or introduce invasive species. All monitoring is performed in a relatively small distance on a flowing river. Natural dispersal of organisms may occur with in these small reaches as they are not isolated. Fish collection and transport gear along with personal equipment (i.e., waders, dry suits, etc) for this monitoring effort is only used on the Restoration Area of the San Joaquin River and is decontaminated after use. Acetic acid is used to clean live holds and bilges in boats and transport tanks.

Project Contacts

Responsible Party: Alicia Forsythe

Primary Contact: Rebecca A Victorine

Principal Investigator: Donald E Portz

Other Personnel:

Name	Role(s)
Clarence Fullard	Co-Investigator
Charles Hueth	Co-Investigator
Shaun Root	Co-Investigator

Zachary Sutphin	Co-Investigator

Attachments

Certification of Identity - P20639T11APPS_16608-2RSignaturePage.pdf (Added Sep 1, 2016)

Contact - Charles Hueth C13936T5Chucks_resume_2015.doc (Added Aug 26, 2016)

Contact - Clarence Fullard C20284T5FullardCurriculumVitae.docx (Added Dec 16, 2016)

Contact - Donald E Portz C14501T5CV_Portz_8-29-1610A1a.docx (Added Aug 29, 2016)

Contact - Shaun Root C19054T5ShaunRootResume.docx (Added Oct 5, 2015)

Contact - Zachary Sutphin C13261T5SutphinCV.docx (Added Aug 26, 2016)

Resources Needed - P20639T15May2014CentralValleySteelhead_Final.docx (Added Aug 25, 2016)

Status

Application Status:	Application Complete		
Date Submitted:	September 1, 2016		
Date Completed:	December 16, 2016		
FR Notice of Receipt Published:	January 11, 2017	**Number:** 2017-00300	
Comment Period Closed:	February 9, 2017	**Comments Received:** Yes	**Comments Addressed:** Yes
Last Date Archived:	December 1, 2017		

- **ESA Section 10(a)(1)(A) permit (Pacific fish/invertebrate enhancement)**

  Current Status: Issued **Status Date:** October 17, 2017

  Section 7 Consultation: Formal Consultation

  NEPA Analysis: Categorical Exclusion

  Expire Date: December 31, 2022

Analyst Information:

1) Jeffrey Abrams — Phone: (916)930-3614
   Email: jeff.abrams@noaa.gov

2)	Amanda Cranford	Phone: (916)930-3706 Email: amanda.cranford@noaa.gov

Reports

Reports Required

Nbr	Report Type	Report Period		Date Due	Status	Date Received
		Start Date	End Date			
1	Annual	12/01/2017	12/31/2018	01/31/2019	N/A	
2	Annual	01/01/2019	12/31/2019	01/31/2020	N/A	
3	Annual	01/01/2020	12/31/2020	01/31/2021	N/A	
4	Annual	01/01/2021	12/31/2021	01/31/2022	N/A	
5	Annual	01/01/2022	12/31/2022	01/31/2023	N/A	
6	Final	12/01/2017	12/31/2022	03/31/2023	N/A	